

What is claimed is:

1. A spinal implant fixation assembly (10) comprising: bone fixation means (12) for fixation of the assembly (10) to a support; rod receiving means (14) operatively connected to said bone fixation means (12) and including a first seat (16) having an inner wall (18) for seating a portion of a rod (20) therein; and locking means (22) engaging said rod receiving means (14) for forcing said inner wall (18) to contour around and engage the rod (20) seated therein and for locking and fixing the rod (20) relative to said assembly (10).

2. An assembly as set forth in claim 1 wherein said rod receiving means (14) includes a tapered outer surface (24), said locking means (22) including an inner surface for being forced over and engaging said outer tapered surface (24) and inwardly deflecting said rod receiving means (14) about said first seat (16) as said locking means (22) further engages said tapered outer surface (14).

3. An assembly as set forth in claim 2 wherein said tapered outer surface (24) is further defined as a tapered threaded surface (24), said locking means (22) including an inner threaded surface (20).

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4. An assembly as set forth in claim 3 wherein said rod receiving means (14) includes a body portion (30) having two arms (32,34) extending therefrom and being substantially parallel relative to each other, said  
5 two arms (32,34) and body portion (30) forming a U-shaped inner surface defining said first seat, said arms (32,34) including said tapered threaded surface (24).

6. An assembly as set forth in claim 1 wherein said fixation  
10 means is further defined as bone fixation means for fixing said assembly (10) to a bone.

6. An assembly as set forth in claim 5 wherein said body  
portion (30) includes said bone fixation means (12) extending therefrom at a  
15 predetermined angle relative to said U-shaped inner surface (18) defining said first seat (16).

7. An assembly as set forth in claim 6 wherein said bone  
fixation means (12) includes a hook portion (38) extending from said body  
20 portion (30') and being integral therewith.

8. An assembly as set forth in claim 6 wherein said bone fixation means includes a screw portion (36) extending from said body portion (30) and being integral therewith.

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9. An assembly as set forth in claim 5 wherein said bone fixation means (12") includes a head portion (40), said rod receiving means (14") including a second seat (44) for seating said head portion (40) therein, said second seat (44) including an outer surface (50) thereabouts, said locking means (22") including a skirt engaging and radially inwardly deflecting said outer surface of said second seat portion (42) for first locking and fixing said head portion (40) within said second seat (44) prior to said locking means (22") locking and fixing the rod (20") within the first seat (16").

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10. An assembly as set forth in claim 9 wherein said rod receiving means (14") consists of a substantially tubular body including a pair of spaced, substantially parallel arms (32",34") extending therefrom and forming a substantially U-shaped seat defining said first seat (16"), said tubular body further including a socket portion including outwardly flaring flanges (46) having distal end portions flaring radially outwardly tapering surfaces (50) relative to a central axis of said rod receiving means defining

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said outer surface (50) of said second seat (44), said skirt portion (52) engaging and inwardly deflecting said distally outwardly-tapering surfaces to engage said socket portion with said head portion (40).

5           11. An assembly as set forth in claim 10 wherein said locking means includes a ring member (52) defining said skirt portion, said tapered outer surface (24'') of said rod receiving means (12'') being a tapered threaded surface, said locking means (22'') further including a nut member (26'') including an inner threaded surface (28'') for engaging and inwardly deflecting  
10       said tapered threaded surface (24'').

          12. An assembly as set forth in claim 11 wherein said head portion (40) is substantially spherical, said socket portion being substantially spherical for seating and engaging said head portion (40) therein.

15           13. An assembly as set forth in claim 11 wherein said ring (52) includes an edge surface (58), said nut member (26'') including an abutment surface (60) for abutting against said edge surface (58) as said nut member (26'') is threaded onto said tapered threaded portion (24'') to force said ring  
20       member (52) over said outer surface of said socket portion.

14. An assembly is set forth in claim 9 wherein said second seat (44) includes gripping means for gripping said head portion (40) within said second seat (44).

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15. A method for locking a rod (20,20") to a bone by fixing a rod seating member (14,14'14") to a bone; seating a portion of a rod (20,20") within a substantially U-shaped seat (16,16") of the seating member (14,14'14"), and locking the rod (20,20") within the U-shaped seat (16,16") while engaging and contouring at least a portion of the U-shaped seat (16,16") about the rod (20,20").

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16. A method as set forth in claim 15 further including the steps of fixing a bone fixation member (12") to a bone; locking and fixing a rod seating member (14") to a head portion (40) of the bone fixation member (12"), and then locking the rod (20") within the U-shaped seat (16").

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17. A method as set forth in claim 16 wherein said locking and fixing step is further defined as forcing a ring member (52) over an outwardly

flared portion (46) of a seat portion (44) to lock and fix the head portion (40) of the bone fixation member (12") therein.

18. A method as set forth in claim 16 wherein said step of  
5 locking the rod (20") within the U-shaped seat (16") is further defined as enlarging an inner threaded surface (28") of a nut member (26") over a tapered outer threaded surface (24") of the U-shaped seat (16") to force the ring (52) over the outer surface (50) of the seat portion (44) to lock and fix the head portion (40) of the bone fixation member (12") therein while simultaneously  
10 deforming the inner surface of the U-shaped seat (16") about the rod (20") seated therein.

19. A spinal implant fixation assembly (10) comprising: bone fixation means (12) for fixation of the assembly (10) to support; rod receiving means (14) operatively connected to said bone fixation means (12) and  
15 including a first seat (16) for seating a portion of a rod therein; and self-locking means (22) disposed about said rod receiving means (14) for securing and self-locking the rod (20) seated within said first seat (16) and fixing the rod (20) relative to said assembly (10).

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20. An assembly as set forth in claim 19 wherein said self-locking means including an outer tapered surface (24) of said rod receiving



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25. An assembly as set forth in claim 24 wherein at least one of said arms 80 includes a hinge portion 82 for allowing outward deflection thereof.

5 26. An assembly as set forth in claim 25 wherein said internal portion includes stop means for engaging an outer surface of said arms 80 to retain said insert member within said internal portion.

10 27. An assembly as set forth in claim 26 wherein said body portion 30"" includes rod retaining means for retaining a rod therein, said internal portion 72 including a first portion adjacent to said rod retaining means and a second portion extending from said first portion said first portion having an inner surface recessed radially outwardly relates to said second portion.

15 28. An assembly as set forth in claim 27 wherein said second portion includes a radially inwardly extending lip at an end thereof most distal relative to said first portion.

20 29. An assembly as set forth in claim 27 wherein said second position includes an end edge most distal relative to said first portion, said end edge being chamfered radially thereabout.



30. An assembly as set forth in claim 27 wherein said arms of said insert member includes an outer surface including engagement means for engaging an inner surface of said internal portion.

5 31. An assembly as set forth in claim 30 wherein said internal portion includes an annular shoulder between said first and second portions, said outer surface of said arms including a step defining said engagement means for engaging said shoulder to prevent said insert from moving beyond a desired engagement location.

10 32. An assembly as set forth in claim 31 wherein said arms have an outer surface tapering inwardly away from said step.

15 33. An assembly as set forth in claim 30 wherein said arms have an outer surface tapering inwardly away from said base portion.

20 34. An assembly as set forth in claim 30 wherein said body includes a neck portion, said rod retaining means including two opposed U-shaped seats extending into said neck portion, said U-shaped seat having a bottom portion thereof extending into said internal portion such that a rod seated in said U-shaped seat abuts against said insert member disposed within said first position and frees said insert member into said second portion, said outer walls of said arms engaging and being forced radially inwardly by said

second portion to collapse and engage a screw head disposed within said pocket.

*1. 35. cylindrical* An insert for retaining a screw head in a spinal fixation assembly, said insert comprising:

a base portion and a plurality of flexible arms extending therefrom *and* combining ~~in~~ with said base portion to form a pocket, said arms defining flexible walls of said pocket extending from said base.

*2. 36.* A body member of a spinal fixation assembly comprising:  
rod receiving means for receiving a portion of a rod member therein; and  
an internal portion for movably retaining a screw head receiving insert therein.

*3. 37.* An assembly as set forth in claim *2* ~~36~~ wherein said internal portion includes stop means for engaging an outer surface of the insert to retain the insert therein.

*4. 38.* An assembly as set forth in claim *2* ~~36~~ wherein said body portion includes rod retaining means for retaining a rod therein, said internal portion including a first portion adjacent to said rod retaining means and a

second portion extending from said first portion, said first portion having an inner surface recessed radially outwardly <sup>relative</sup> to said second portion.

- 5 ~~39~~ <sup>4</sup>. An assembly as set forth in claim ~~38~~ wherein said second portion including a radially inwardly extending lip at an end thereof most distal <sup>relative</sup> to said first portion.

10 ~~40~~. An assembly as set forth in claim 29 wherein said second position includes an end edge most distal relative to said first portion, said end edge being chamfered radially thereabout.

- 6 ~~41~~. A spinal fixation assembly comprising:  
a body member including an internal portion and an insert member including a screw head receiving pocket having an expanded condition to receive and release a screw head and a contracted condition for fixedly engaging a screw head therein, said internal position movably containing said insert member between a first portion of said internal portion wherein said insert member is in said expanded condition and a second portion wherein said insert member is in said contracted condition.

- 20 ~~42~~ <sup>6</sup>. An assembly as set forth in claim ~~41~~ wherein said first portion radially outwardly recessed relative to said second position.

43. A method of retaining a screw head in a spinal fixation assembly by;

5 inserting a screw head into an expanded pocket of an insert contained within a first portion of an internal portion of a body member wherein the internal portion includes the first portion which is radially outwardly recessed relative to a second portion and;

10 moving the insert into the second portion, which comprises the pocket of the insert, into a contracted condition to fixedly engage the screw head within the pocket.

44. An method as set forth in claim 43 including the further steps of disposing a portion of a rod member into a seat portion of the body member, abutting the disposed portion of the rod member against the insert member which is disposed in the first portion in the expanded condition and  
15 moving the insert into the second position, the rod member locking the insert in the second portion.

45. An method as set forth in claim 44 further including the  
20 steps of inserting a non-straight portion of the rod into the seat portion and further compressing the insert member into the first portion.

